ELEMENTARY
(Grades PreK-5)

MATHEMATICS
PROGRAM

RECOGNITION OF AMERICAN INDIAN CULTURE AND HERITAGE IN THE CURRICULUM PROCESS

BOARD POLICY - INSTRUCTION #2450

The MCPS Board of Trustees fully supports Article X of the Montana Constitution and is actively committed to develop for all students an understanding of American and Montana Indian people and their histories, as well as foster respect for their respective cultures.

Because of the unique position and place in American history, the American Indian peoples' role in the development of the United States, with emphasis on the experience of the Montana Tribes, shall be included wherever appropriate in the instruction of Missoula County Public School students, in accordance with the state Constitution and state standards. Instructions concerning the historic and current roles of Indian people shall be delivered in a respectful, informative, and sensitive manner. When the social studies curriculum and other curricula are updated according to the District's curriculum cycle, the written curriculum shall reflect this policy. Staff development will be provided pertinent to curriculum implementation.

NOTE: The District has nondiscriminatory policies in effect, which may be referenced.

Legal Reference:	Art. X, Sec. 1(2), Montana Constitution	
	§§ 20-1-501, et seq., MCA	Recognition of American Indian cultural heritage - legislative intent
10.55.603 ARM	Curriculum Development and Assessment	
10.55.701 ARM	Board of Trustees	
10.55.803 ARM	Learner Access	

Policy History:

History of Previous File 2121:	Presented to PN&P Committee for first reading, 3/30/00
	Approved First Reading, 4/11/00
	Presented to PN&P Committee for second reading, 4/27/00
	Revised at C&I Committee, 5/2/00
	Adopted on: October 10, 2000

Adopted on: January 14, 2003 (Policy recodified in Series 2000 adoption)

MONTANA OFFICE OF PUBLIC INSTRUCTION
INDIAN EDUCATION FOR ALL
ELEMENTARY LESSON PLANS
http://opi.mt.gov/Programs/IndianEd/curricsearch.html

Specific Grade Level	IEFA Math Lesson Title	URL Address
Kindergarten	Counting 1:1 Correspondence	http://opi.mt.gov/PDF/IndianEd/Search/Mathematics/GK%20Counting%201to1%20Corres.pdf
Kindergarten	Shapes in the Blackfeet Language	http://opi.mt.gov/PDF/IndianEd/Search/Mathematics/GK%20Shapes%20in%20Blackfeet.pdf
Kindergarten	Geometry and Blackfeet Portraits	http://www.opi.mt.gov/pdf/IndianEd/Search/Mathematics/GK%20Geometry%20and%20Blackfeet%20Portraits.pdf
Grade 1	Probability and Odds Data Analysis	http://www.opi.mt.gov/pdf/IndianEd/Search/Mathematics/G%201%20Probability%20and%20Data%20Analysis.pdf
Grade 2	Buffalo Runner	http://opi.mt.gov/PDF/IndianEd/Search/Mathematics/G%202%20Buffalo%20Runner.pdf
Grade 3	Pow wow Trails	http://opi.mt.gov/PDF/IndianEd/Search/Mathematics/G%203%20Powwow%20Trails.pdf
Grade 4	I am Beading	http://www.opi.mt.gov/pdf/IndianEd/Search/Mathematics/G%204%20I%20am%20Beading.pdf
Grade 5	Estimating the Area of a Reservation	http://opi.mt.gov/PDF/IndianEd/Search/Mathematics/G%205%20Estimate%20Area-Reservatn.pdf
Grade 5	Geometric Beadwork	http://opi.mt.gov/PDF/IndianEd/Search/Mathematics/G%205%20Geometric%20Beadwork.pdf
Grade 5	Graphing Native American Populations	http://opi.mt.gov/PDF/IndianEd/Search/Mathematics/G%205%20Graph%20NA%20Populations.pdf
Grade 5	Graphing Old Man's Journey	http://opi.mt.gov/PDF/IndianEd/Search/Mathematics/G%205%20Graph%20Old%20Man%27s%20Journey.pdf

PRE-KINDERGARTEN MATHEMATICS

Overview:

The preschool/pre-kindergarten population includes children between at least 2 years, 9 months until they are kindergarten eligible. A majority attend programs in diverse settings—community-based early care and education centers, family child care, Head Start, and public preschools. Some children do not attend any formal program. These standards apply to children who are at the end of that age group, meaning older four- and younger five-year olds.

In this age group, foundations of mathematical understanding are formed out of children's experiences with real objects and materials. The standards can be promoted through play and exploration activities, and embedded in almost all daily activities. They should not be limited to "math time." The standards should be considered guideposts to facilitate young children's underlying mathematical understanding.

In preschool or pre-kindergarten, activity time should focus on two critical areas: (1) developing an understanding of whole numbers to 10, including concepts of one-to-one correspondence, counting, cardinality (the number of items in a set), and comparison; (2) recognizing two-dimensional shapes, describing spatial relationships, and sorting and classifying objects by one or more attributes. Relatively more learning time should be devoted to developing children's sense of number as quantity than to other mathematics topics.

(1) These young children begin counting and quantifying numbers up to 10. Children begin with oral counting and recognition of numerals and word names for numbers. Experience with counting naturally leads to quantification. Children count objects and learn that the sizes, shapes, positions, or purposes of objects do not affect the total number of objects in the group. One-to-one correspondence with its matching of elements between the sets, provides the foundation for the comparison of groups and the development of comparative language such as, *more than, less than,* and *equal to*.

(2) Young children explore shapes and the relationships among them. They identify the attributes of different shapes including the length, area, weight by using vocabulary such as: *long, short, tall, heavy, light, big, small, wide, narrow*. They compare objects using comparative language such as: *longer/shorter, same length, heavier/lighter*. They explore and create 2- and 3-dimensional shapes by using various manipulative and play materials such as: popsicle sticks, blocks, pipe cleaners, and pattern blocks. They sort, categorize, and classify objects and identify basic 2-dimensional shapes using the appropriate language.

Counting and Cardinality

- Know number names and the counting sequence.
- Count to tell the number of objects.
- Compare numbers.

Operations and Algebraic Thinking

- Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

Measurement and Data

- Describe and compare measurable attributes.
- Classify objects and count the number of objects in each category.
- Work with money.

Geometry

- Identify and describe shapes (squares, circles, triangles, rectangles).
- Analyze, compare, create, and compose shapes.

Based on the Massachusetts Curriculum Framework for Mathematics, March 2011 by the Massachusetts Department of Elementary and Secondary Education.

Standards for Mathematical Practice: Pre-Kindergarten Explanations and Examples	
Standards	**Explanations and Examples**
Students are expected to:	The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.
PK.MP.1. Make sense of problems and persevere in solving them.	Pre-Kindergarten students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" or they may try another strategy.
PK.MP.2. Reason abstractly and quantitatively.	Pre-Kindergarten students begin to recognize that a number represents a specific quantity. Then, they connect the quantity to written symbols.
PK.MP.3. Construct viable arguments and critique the reasoning of others.	Pre-Kindergarten students construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also begin to develop their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?"
PK.MP.4. Model with mathematics.	Pre-Kindergarten students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list. Students need opportunities to connect the different representations and explain the connections.
PK.MP.5. Use appropriate tools strategically.	Pre-Kindergarten students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful.
PK.MP.6. Attend to precision.	Pre-Kindergarten students begin to develop their mathematical communication skills.
PK.MP.7. Look for and make use of structure.	Pre-Kindergarten students begin to discern a pattern or structure (i.e., abab patterns).
PK.MP.8. Look for and express regularity in repeated reasoning.	

Mathematics Standards: Counting and Cardinality

Pre-Kindergarten (older 4-year-olds to younger 5-year-olds)
Know number names and the count sequence
PK.CC.1. Listen to and say the names of numbers in meaningful contexts.
PK.CC.2. (Begins in kindergarten.)
PK.CC.3. Represent a number of objects with a written numeral 0 – 5 (with 0 representing a count of no objects).
Count to tell the number of objects
PK.CC.4. Understand the relationship between numerals and quantities to 10. a. When counting objects, say the number names in the standards order, pairing each object with one and only one number name and each number name with one and only one object from a variety of cultural contexts, including those of Montana American Indians. b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted. c. Understand that each successive number name refers to a quantity that is one larger.
PK.CC.5. Count to answer "how many?" questions about as many as 10 things arranged in a line, a rectangular array, or a circle, or as many as 5 things in a scattered configuration; given a number from 1-10, count out that many objects from a variety of cultural contexts, including those of Montana American Indians.
Compare numbers
PK.CC.6. Identify "first" and "last" related to order or position.
PK.CC.7. (Begins in kindergarten.)

Mathematics Standards: Operations and Algebraic Thinking

Pre-Kindergarten (older 4-year-olds to younger 5-year-olds)
Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from
PK.OA.1. With support and prompting, demonstrate an understanding of addition and subtraction by using objects, fingers, and responding to practical situations (e.g., if we have 3 apples and add 2 more, how many apples do we have in all?).
PK.OA.2. (Begins in kindergarten.)
PK.OA.3. (Begins in kindergarten.)
PK.OA.4. (Begins in kindergarten.)
PK.OA.5. (Begins in kindergarten).

Mathematics Standards: Number and Operations in Base Ten

Pre-Kindergarten (older 4-year-olds to younger 5-year-olds)
Work with numbers 11-19 to gain foundations for place value
PK.NBT.1. (Begins in kindergarten).

Mathematics Standards: Measurement and Data

Pre-Kindergarten (older 4-year-olds to younger 5-year-olds)
Describe and compare measurable attributes
PK.MD.1. Recognize the attributes of length, area, weight, and capacity of everyday objects using appropriate vocabulary (e.g., *long, short, tall, heavy, light, big, small, wide, narrow*).
Classify objects and count the number of objects in each category
PK.MD.2. Compare the attributes of length and weight for two objects, including longer/shorter, same length; heavier/lighter, same weight; holds more/less, holds the same amount.
PK.MD.3. Sort, categorize, and classify objects by more than one attribute.
PK.MD.4. (Begins in kindergarten.)

Mathematics Standards: Geometry

Pre-Kindergarten (older 4-year-olds to younger 5-year-olds)
Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres)
PK.G.1. Identify relative position of objects in space, and use appropriate language (e.g., *beside, inside, next to, close to, above, below, apart*).
PK.G.2. Identify various two-dimensional shapes regardless of their size.
PK.G.3. (Begins in kindergarten.)
Analyze, compare, create, and compose shapes
PK.G.4. Analyze, compare, and sort two- and three-dimensional shapes and objects of different sizes, using informal language to describe their similarities, differences, and other attributes (e.g., color, size, shape).
PK.G.5. Create and represent three-dimensional shapes (ball/sphere, square box/cube, tube/cylinder) using various manipulative materials (e.g., popsicle sticks, blocks, pipe cleaners, pattern blocks, clay).
PK.G.6. (Begins in kindergarten.)

KINDERGARTEN MATHEMATICS

Overview:

Domains	Counting and Cardinality	Operations and Algebraic Thinking	Number and Operations in Base Ten	Measurement and Data	Geometry
Clusters	• Know number names and the count sequence • Counting to tell the number of objects • Compare numbers	• Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from	• Work with numbers 11 – 19 to gain foundations for place value	• Describe and compare measurable attributes • Classify objects and count the number of objects in each category	• Identify and describe shapes • Analyze, compare, create and compose shapes
Mathematical Practices	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively.	3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.	5. Use appropriate tools strategically. 6. Attend to precision.	7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.	
Major Interdisciplinary Kindergarten Units	English Language Arts: across the content areas • Reading • Writing • Speaking & Listening • Language	Indian Education for All Titles • *Dancing With Cranes* by Ron Hall • *Good Luck Cat* by Joy Harjo • *Little Duck Sikihpsis* by Beth Cuthand	Science • Properties of Matter • Dinosaurs/Fossils • Observe and Describe Animals	Social Studies Learning and Working Now and Long Ago • Learning to Work Together • Exploring, Creating, and Communicating • Reaching Out to Times Past	

In Kindergarten, instructional time should focus on two critical areas:

1. Representing and comparing whole numbers, initially with sets of objects

Students use numbers, including written numerals, to represent quantities and to solve quantitative problems, such as counting objects in a set; counting out a given number of objects; comparing sets or numerals; and modeling simple joining and separating situations with sets of objects, or eventually with equations such as $5 + 2 = 7$ and $7 – 2 = 5$. (Kindergarten students should see addition and subtraction equations, and student writing of equations in kindergarten is encouraged, but it is not required.) Students choose, combine, and apply effective strategies for answering quantitative questions, including quickly recognizing the cardinalities of small sets of objects, counting and producing sets of given sizes, counting the number of objects in combined sets, or counting the number of objects that remain in a set after some are taken away.

2. Describing shapes and space

Students describe their physical world using geometric ideas (e.g., shape, orientation, spatial relations) and vocabulary. They identify, name, and describe basic two-dimensional shapes, such as squares, triangles, circles, rectangles, and hexagons, presented in a variety of ways (e.g., with different sizes and orientations), as well as three-dimensional shapes such as cubes, cones, cylinders and spheres. They use basic shapes and spatial reasoning to model objects in their environment and to construct more complex shapes.

More learning time in Kindergarten should be devoted to number than to other topics.

Cluster: Know number names and the count sequence.

1. Count to 100 by ones and by tens.
   - I can count to 100 by ones.
   - I can count to 100 by tens.

2. Count forward beginning from a given number within the known sequence (instead of having to begin at 1).
   - I can count forward from any given number up to 100.

3. Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20 (with 0 representing a count of no objects).
   - I can write my numbers from 0 to 20.
   - I can write the number that names how many objects are in a group 0 to 20.

Cluster: Count to tell the number of objects.

4. Understand the relationship between numbers and quantities; connect counting to cardinality.
   a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object from a variety of cultural contexts, including those of Montana American Indians.
   - I can count objects by touching and saying the correct number for each object.

   a. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted from a variety of cultural content, including those of Montana American Indians.
   - I can name the number of objects in a group after counting.
   - I can explain the number of objects in a group does not change even when I start counting with a different object in that group or if the group has been mixed up.

   b. Understand that each successive number name refers to a quantity that is one larger.
   - I can name the number that is one more than the group shown.
   - I can recognize a group that is one more than the group shown.

5. Count to answer "how many?" questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.
   - I can count scattered objects up to groups of 10.
   - I can count organized objects that are in a group up to 20.
   - I can count out the correct amount of objects, when given a number, to make a group up to 20.

Cluster: Compare numbers.

6. Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. (Note: Include groups with up to ten objects.)
   - I can compare two groups (0 to 10) and identify which group is greater than, less than, or equal to.

7. Compare two numbers between 1 and 10 presented as written numerals.
    - I can compare two numbers from 0 to 10 and identify which is larger/smaller, more/less, greater than/less than.

Domain: Operations and Algebraic Thinking K.OA

Cluster: Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.

1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations. (Note: Drawings need not show details, but should show the mathematics in the problem—this applies wherever drawings are mentioned in the Standards.
    - I can use a variety of strategies to add (including fingers, objects, pictures, sounds, etc.).
    - I can use a variety of strategies to subtract (including fingers, objects, pictures, sounds, etc.).

2. Solve addition and subtraction word problems from a variety of cultural contexts, including those of Montana American Indians, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
    - I can solve a word problem using addition and subtraction.

3. Decompose numbers less than or equal to 10 into pairs in more than one way, e.g., by using objects or drawings, and record each decomposition by a drawing or equation (e.g., $5 = 2 + 3$ and $5 = 4 + 1$).
    - I can decompose a number from 1 to 10 and show it in different ways.

4. For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
    a. I can be given a number from 1 to 10, find the number to make 10, and show it in different ways.

5. Fluently add and subtract within 5.
    - I can fluently add and subtract any of the numbers 1 to 5.

Domain: Number and Operations in Base Ten K.NBT

Cluster: Work with numbers 11-19 to gain foundations for place value.

1. Compose and decompose numbers from 11 to 19 into ten ones and some further ones, e.g., by using objects or drawings, and record each composition or decomposition by a drawing or equation (such as $18 = 10 + 8$); understand that these numbers are composed of ten ones and one, two, three, four, five, six, seven, eight, or nine ones.
    - I can compose and decompose the numbers from 11 to 19 by showing how many tens and ones make a number.

Domain: Measurement and Data K.MD

Cluster: Describe and compare measurable attributes.

1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.
   - I can describe different ways to measure an object.

2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. *For example, directly compare the heights of two children and describe one child as taller/shorter.*
   - I can compare two objects by measurement and describe how they are different.

Cluster: Classify objects and count the number of objects in each category.

3. Classify objects from a variety of cultural contexts, including those of Montana American Indians, into given categories; count the numbers of objects in each category and sort the categories by count (Note: Limit category counts to be less than equal to 10.).
   - I can sort objects into groups so that each group has something the same (color, shape, size, etc.).
   - I can count the objects in a group and put the groups in order from least to greatest.

Domain: Geometry K.G

Cluster: Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

1. Describe objects, including those of Montana American Indians, in the environment using names of shapes, and describe the relative positions of these objects using terms such as *above*, *below*, *beside*, *in front of*, *behind*, and *next to*.
   - I can identify and describe objects using names of shapes.
   - I can describe the position of an object using positional words such as, *above, below, besides, in front of, behind*, and *next to*.

2. Correctly name shapes regardless of their orientations or overall size.
   - I can name the flat/ two-dimensional and solid/ three-dimensional shapes even if they are different sizes and have been moved around. (rotated, flipped, etc.)

3. Identify shapes as two-dimensional (lying in a plane, "flat") or three-dimensional ("solid").
   - I can name the flat/ two-dimensional shapes.
   - I can name the solid/three-dimensional shapes.

Cluster: Analyze, compare, create, and compose shapes.

4. Analyze and compare two- and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts (e.g., number of sides and vertices/"corners") and other attributes (e.g., having sides of equal length).
   - I can explain and compare the parts of a flat/two-dimensional shape.
   - I can explain and compare the parts of a solid/three-dimensional shape.

5. Model shapes in the world from a variety of cultural contexts, including those of Montana American Indians, by building shapes from components (e.g., sticks and clay balls) and drawing shapes.
   - I can create and draw flat/two-dimensional shapes and solid/three-dimensional shapes.

6. Compose simple shapes to form larger shapes. *For example, "Can you join these two triangles with full sides touching to make a rectangle?"*
   - I can use simple shapes to compose larger shapes.

Standards	Explanations and Examples
Students are expected to:	The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.
K.MP.1. Make sense of problems and persevere in solving them.	In Kindergarten, students begin to build the understanding that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" or they may try another strategy.
K.MP.2. Reason abstractly and quantitatively.	Younger students begin to recognize that a number represents a specific quantity. Then, they connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
K.MP.3. Construct viable arguments and critique the reasoning of others.	Younger students construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also begin to develop their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.
K.MP.4. Model with mathematics.	In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
K.MP.5. Use appropriate tools strategically.	Younger students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, kindergarteners may decide that it might be advantageous to use linking cubes to represent two quantities and then compare the two representations side-by-side.
K.MP.6. Attend to precision.	As kindergarteners begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning.
K.MP.7. Look for and make use of structure.	Younger students begin to discern a pattern or structure. For instance, students recognize the pattern that exists in the teen numbers; every teen number is written with a 1 (representing one ten) and ends with the digit that is first stated. They also recognize that $3 + 2 = 5$ and $2 + 3 = 5$.
K.MP.8. Look for and express regularity in repeated reasoning.	In the early grades, students notice repetitive actions in counting and computation, etc. For example, they may notice that the next number in a counting sequence is one more. When counting by tens, the next number in the sequence is "ten more" (or one more group of ten). In addition, students continually check their work by asking themselves, "Does this make sense?"

Standard	Kindergarten Vocabulary (bold indicates Montana Common Core Standards vocabulary)
K.CC.1	**count**, number, sequence, ones, tens
K.CC.2	**count**, number
K.CC.3	**count**, number, object, numeral
K.CC.4	**count**, number, pair, quantity
K.CC.5	**count**, number, scattered, organized, array, line
K.CC.6	number, compare, **greater than**, **less than**, **equal to**, matching, strategies
K.CC.7	number, compare, **greater than**, **less than**, **equal to**, larger/smaller, more/less, identify
K.OA.1	**addition**, **add**, **subtraction**, **subtract**, **expression**, **equation**
K.OA.2	**addition**, **add**, **subtraction**, **subtract**, solve, word problem
K.OA.3	**decompose**, **equation**
K.OA.4	**add**, **make 10**, **addend**, **equation**
K.OA.5	**add**, **subtract**
K.NBT.1	**compose**, **decompose**, **equation**
K.MD.1	measure, describe, different, length, weight, height, longer, shorter, taller, heavier, lighter, attribute
K.MD.2	compare, attribute, more, less
K.MD.3	same, sort, category, classify
K.G.1	**shapes**, square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, position word, above, below, beside, in front of, behind, next to, between, under, over, by
K.G.2	**shapes**, square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, 2-dimensional, 3-dimensional
K.G.3	**shapes**, square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, 2-dimensional, 3-dimensional, solid, flat,
K.G.4	**shapes**, square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, **2-dimensional**, **3-dimensional**, corners, sides, vertex, similarities
K.G.5	**shapes**, square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, 2-dimensional, 3-dimensional
K.G.6	**shapes**, square, circle, triangle, rectangle, hexagon, cube, cone, cylinder, sphere, 2-dimensional, 3-dimensional, **compose**

GRADE 1 MATHEMATICS

Overview:

Domains	Operations and Algebraic Thinking	Number & Operations in Base Ten	Measurement and Data	Geometry
Clusters	• Represent and solve problems involving addition and subtraction • Understand and apply properties of operations and the relationship between addition and subtraction • Add and subtract within 20 • Work with addition and subtraction equations	• Extend the counting sequence • Understand place value • Use place value understanding and properties of operations to add and subtract	• Measure lengths indirectly and by iterating length units • Tell and write time • Represent and interpret data	• Reason with shapes and their attributes
Mathematical Practices	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively.	3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.	5. Use appropriate tools strategically. 6. Attend to precision.	7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Major Interdisciplinary Grade 1 Units	English Language Arts: across the content areas • Reading • Writing • Speaking & Listening • Language	Indian Education for All Titles • *Two Pairs of Shoes* by Esther Sanderson • *Where did you get your Moccasins?* By Bernelda Wheeler • *White Bead Ceremony* by Sherrin Watkins	Science • Space: Investigating Sunlight and Moonlight • How Animals and Plants Interact in Their Environment • Nutrition/Food Pyramid	Social Studies **A Child's Place in** Time and Space: • Developing Social Skills and Responsibilities • Expanding Children's Geographic and Economic Worlds • Developing Awareness of Cultural Diversity, Now and Long Ago

In Grade 1, instructional time should focus on four critical areas:

1. Developing understanding of addition, subtraction, and strategies for addition and subtraction within 20

   Students develop strategies for adding and subtracting whole numbers based on their prior work with small numbers. They use a variety of models, including discrete objects and length-based models (e.g., cubes connected to form lengths), to model add-to, take-from, put-together, take-apart, and compare situations to develop meaning for the operations of addition and subtraction, and to develop strategies to solve arithmetic problems with these operations. Students understand connections between counting and addition and subtraction (e.g., adding two is the same as counting on two). They use properties of addition to add whole numbers and to create and use increasingly sophisticated strategies based on these properties (e.g., "making tens") to solve addition and subtraction problems within 20. By comparing a variety of solution strategies, children build their understanding of the relationship between addition and subtraction.

2. Developing understanding of whole number relationship and place value, including grouping in tens and ones

   Students develop, discuss, and use efficient, accurate, and generalizable methods to add within 100 and subtract multiples of 10. They compare whole numbers (at least to 100) to develop understanding of and solve problems involving their relative sizes. They think of whole numbers between 10 and 100 in terms of tens and ones (especially recognizing the numbers 11

to 19 as composed of a ten and some ones). Through activities that build number sense, they understand the order of the counting numbers and their relative magnitudes.

3. Developing understanding of linear measurement and measuring lengths as iterating length units
Students develop an understanding of the meaning and processes of measurement, including underlying concepts such as iterating (the mental activity of building up the length of an object with equal-sized units) and the transitivity principle for indirect measurement. (Note: students should apply the principle of transitivity of measurement to make direct comparisons, but they need not use this technical term.)

4. Reasoning about attributes of, and composing and decomposing geometric shapes
Students compose and decompose plane or solid figures (e.g., put two triangles together to make a quadrilateral) and build understanding of part-whole relationships as well as the properties of the original and composite shapes. As they combine shapes, they recognize them from different perspectives and orientations, describe their geometric attributes, and determine how they are alike and different, to develop the background for measurement and for initial understandings of properties such as congruence and symmetry.

Domain: Operations and Algebraic Thinking 1.OA

Cluster: Represent and solve problems involving addition and subtraction.

1. Use addition and subtraction within 20 to solve word problems within a cultural context, including those of Montana American Indians, involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
    - I can use addition and subtraction within 20 to solve word problems using objects, drawings, and equations.
    - I can solve word problems using unknowns in all positions. (8 + 2 = _, 8 + _ = 10, 10 - 8 = _, 10 - _ = 2)

2. Solve word problems within a cultural context, including those of Montana American Indians, that call for addition of three whole numbers whose sum is less than or equal to 20, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
    - I can solve word problems that call for addition of three whole numbers whose sum is within 20 by using objects, drawings, and equations.
    - I can use a symbol for the unknown number.

Cluster: Understand and apply properties of operations and the relationship between addition and subtraction.

3. Apply properties of operations as strategies to add and subtract. *Examples: If 8 + 3 = 11 is known, then 3 + 8 = 11 is also known. (Commutative property of addition.) To add 2 + 6 + 4, the second two numbers can be added to make a ten, so 2 + 6 + 4 = 2 + 10 = 12. (Associative property of addition.)* (Note: Students need not use the formal terms for these properties.)

- I can apply strategies to add and subtract. (Examples: Commutative and Associative properties of addition, switch partners, make a ten)

4. Understand subtraction as an unknown-addend problem. *For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.*
   - I can show the relationship between addition and subtraction. (note: subtraction is the inverse of *addition)*

Cluster: Add and subtract within 20.

5. Relate counting to addition and subtraction (e.g., by counting on 2 to add 2).
   - I can use counting to add and subtract.

6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14); decomposing a number leading to a ten (e.g., 13 – 4 = 13 – 3 – 1 = 10 – 1 = 9); using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 – 8 = 4); and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).
   - I can fluently add and subtract within 10.
   - I can add and subtract within 20 using a variety of strategies. (Examples: make a ten, decompose numbers, doubles or other "friendly" numbers)

Cluster: Work with addition and subtraction equations.

7. Understand the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false. For example, which of the following equations are true and which are false? 6 = 6, 7 = 8 – 1, 5 + 2 = 2 + 5, 4 + 1 = 5 + 2.
   - I can interpret the meaning of the equal sign.
   - I can determine if equations are true or false.

8. Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 + _ = 11, 5 = _ – 3, 6 + 6 = _.*
   - I can solve addition and subtraction equations to determine the unknown whole number.

Domain: Number and Operations in Base Ten 1.NBT

Cluster: Extend the counting sequence.

1. Count to 120, starting at any number less than 120. In this range, read and write numerals and represent a number of objects with a written numeral.
   - I can count to 120, starting from any number.
   - I can read, write, and represent numerals to 120.

Cluster: Understand place value.

2. Understand that the two digits of a two-digit number represent amounts of tens and ones. Understand the following as special cases:
   a. 10 can be thought of as a bundle of ten ones — called a "ten."

b. The numbers from 11 to 19 are composed of a ten and one, two, three, four, five, six, seven, eight, or nine ones.
c. The numbers 10, 20, 30, 40, 50, 60, 70, 80, 90 refer to one, two, three, four, five, six, seven, eight, or nine tens (and 0 ones).

- I can identify how many ones are in a ten.
- I can represent two-digit numbers as tens and ones.
- I can represent numbers 11 to 19, as tens and ones.
- I can refer to multiples of ten (10, 20, 30,...) as groups of ten and 0 ones.

3. Compare two two-digit numbers based on meanings of the tens and ones digits, recording the results of comparisons with the symbols >, =, and <.
   - I can use the symbols >, <, and = to compare two two-digit numbers.

Cluster: Use place value understanding and properties of operations to add and subtract.

4. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten.
   - I can add a two-digit number and a one-digit number within 100.
   - I can add a two-digit number and multiples of ten within 100.
   - I can use a variety of strategies to show the relationship between addition and subtraction and explain my reasoning (models, drawings, place-value strategies, properties of addition and subtraction).

5. Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.
   - I can mentally find 10 more or 10 less of a two-digit number.

6. Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
   - I can subtract multiples of ten from other multiples of ten within 100 using a variety of strategies to support my reasoning.

Domain: Measurement and Data 1.MD

Cluster: Measure lengths indirectly and by iterating length units.

1. Order three objects from a variety of cultural contexts, including those of Montana American Indians, by length; compare the lengths of two objects indirectly by using a third object.
   - I can order three objects by length.
   - I can compare the lengths of two objects by using the third object.

2. Express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps. *Limit to contexts where the object being measured is spanned by a whole number of length units with no gaps or overlaps.*
   - I can measure an object using multiple shorter, same-size length units.
   - I can measure an object to the nearest whole number.

Cluster: Tell and write time.

3. Tell and write time in hours and half-hours using analog and digital clocks.
   - I can tell time in hours and half-hours using analog and digital clocks.
   - I can write time in hours and half-hours using analog and digital clocks.

Cluster: Represent and interpret data.

4. Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
   - I can organize, represent, and interpret data with up to three categories.
   - I can ask and answer questions about data using the words total, more than, and less than.

Domain: Geometry 1.G

Cluster: Reason with shapes and their attributes.

1. Distinguish between defining attributes (e.g., triangles are closed and three-sided) versus non-defining attributes (e.g., color, orientation, overall size); build and draw shapes to possess defining attributes.
   - I can identify, define, draw, and create geometric shapes (square, circle, triangle, rectangle, hexagon, trapezoid, parallelogram, cube, cone, cylinder, sphere, rectangular prism).

2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape. (Note: Students do not need to learn to formal names such as "right rectangular prism.")
   - I can compose two- and three-dimensional shapes to create new shapes.

3. Partition circles and rectangles into two and four equal shares, describe the shares using the words *halves*, *fourths*, and *quarters*, and use the phrases *half of*, *fourth of*, and *quarter of*. Describe the whole as two of, or four of the shares. Understand for these examples that decomposing into more equal shares creates smaller shares.
   - I can divide circles and rectangles into two or four equal shares.
   - I can use words like half, halves, fourths, quarters, and equal shares.

Standards	Explanations and Examples
Students are expected to:	The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.
1.MP.1. Make sense of problems and persevere in solving them.	In first grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Younger students may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They are willing to try other approaches.
1.MP.2. Reason abstractly and quantitatively.	Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities.
1.MP.3. Construct viable arguments and critique the reasoning of others.	First graders construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They also practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask questions.
1.MP.4. Model with mathematics.	In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
1.MP.5. Use appropriate tools strategically.	In first grade, students begin to consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, first graders decide it might be best to use colored chips to model an addition problem.
1.MP.6. Attend to precision.	As young children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
1.MP.7. Look for and make use of structure.	First graders begin to discern a pattern or structure. For instance, if students recognize *12 + 3 = 15, then they also know 3 + 12 = 15. (Commutative property of addition.) To add 4 + 6 + 4, the first two numbers can be added to make a ten, so 4 + 6 + 4 = 10 + 4 = 14.*
1.MP.8. Look for and express regularity in repeated reasoning.	In the early grades, students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract "ten" and multiples of "ten" they notice the pattern and gain a better understanding of place value. Students continually check their work by asking themselves, "Does this make sense?"

Standard	Grade 1 Montana Common Core Standards Vocabulary	Math Expressions Vocabulary
1.OA.1	addition, add, subtraction, subtract, equation, adding to, taking from, putting together, taking apart, compose, decompose	break apart
1.OA.2	addition, add, sum, equation, unknown number, symbol, solve, word problem	total, unknown partner, unknown total, story problem
1.OA.3	addition, add, subtraction, subtract, commutative property, associative property	switch partners, unknown partner, math mountain
1.OA.4	addition, subtraction, addend	partner
1.OA.5	addition, subtraction, count on, count back	count on
1.OA.6	addition, add, subtraction, subtract, count on, make a 10, fluency, decompose,	break apart, friendly numbers
1.OA.7	equal sign, equation, true, false, addition, subtraction	not equal
1.OA.8	addition, subtraction, whole number	total, unknown partner, unknown total
1.NBT.1	count, numeral	digit
1.NBT.2	two-digit number, tens, ones, bundle	teen number, decade number, ten stick, quick ten
1.NBT.3	> greater than, < less than, = equal	
1.NBT.4	add, multiple of 10, compose, place value	decade number, tens and ones, tens sticks, one circles
1.NBT.5	add, subtract, mental math,	
1.NBT.6	add, subtract, 10 more, 10 less, multiples of 10	
1.MD.1	measure, measurement, length, order, compare	standard unit of length, non-standard unit of length, estimate
1.MD.2	length, units of length, longer, shorter,	ruler, centimeters, inch
1.MD.3	time, hour, half-hour, analog clock, digital clock	half past
1.MD.4	data, organize, interpret, more, less, total	fewer, least, most, graph, table
1.G1.	square, triangle, circle, rectangle, trapezoid, hexagon, parallelogram, cube, cone, cylinder, rectangular prism, sphere, defining attributes, non-defining attributes, sides, angles, faces, sides, angles, shape	flat shapes, solid shapes
1.G.2	two-dimensional shape, three-dimensional half-circle, quarter-circle, compose, decompose, composite	combine, congruent, symmetry, symmetrical, line of symmetry
1.G.3	half, haves, half of, quarters, fourth of, quarter of, whole	

GRADE 2 MATHEMATICS

Overview:

Domains	Operations and Algebraic Thinking	Number & Operations in Base Ten	Measurement and Data	Geometry
Clusters	• Represent and solve problems involving addition and subtraction • Add and subtract within 20 • Work with equal groups of objects to gain foundations for multiplication	• Understand place value • Use place value and properties of operations to add and subtract	• Measure and estimate lengths in standard units • Relate addition and subtraction to length • Work with time and money • Represent and interpret data	• Reason with shapes and their attributes
Mathematical Practices	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively.	3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.	5. Use appropriate tools strategically. 6. Attend to precision.	7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Major Interdisciplinary Grade 2Units	English Language Arts: across the content areas • Reading • Writing • Speaking & Listening • Language	Indian Education for All Titles • *Jingle Dancer* by Cynthia Leitich Smith • *Morning on the Lake* by Jan Waboose Bourdeau • *Range Eternal* by Louise Erdrich • *Red Parka Mary* by Peter Eyvindson	Science • States of Matter: Solids, Liquids, Gases • Life Cycles of Plants • Life Cycles of Animals	Social Studies People Who Make a Difference: • Parents, Grandparents, and Family Members • People Who Supply Our Needs • People from Many Cultures Now and Long Ago • Geographic Awareness

In Grade 2, instructional time should focus on four critical areas:

1. Extending understanding of base-ten notation

Students extend their understanding of the base-ten system. This includes ideas of counting in fives, tens, and multiples of hundreds, tens, and ones, as well as number relationships involving these units, including comparing. Students understand multi-digit numbers (up to 1000) written in base-ten notation, recognizing that the digits in each place represent amounts of thousands, hundreds, tens, or ones (e.g., 853 is 8 hundreds + 5 tens + 3 ones).

2. Building fluency with addition and subtraction

Students use their understanding of addition to develop fluency with addition and subtraction within 100. They solve problems within 1000 by applying their understanding of models for addition and subtraction, and they develop, discuss, and use efficient, accurate, and generalizable methods to compute sums and differences of whole numbers in base-ten notation, using their understanding of place value and the properties of operations. They select and accurately apply methods that are appropriate for the context and the numbers involved to mentally calculate sums and differences for numbers with only tens or only hundreds.

3. Using standard units of measure

Students recognize the need for standard units of measure (centimeter and inch) and they use rulers and other measurement tools with the understanding that linear measure involves iteration of units. They recognize that the smaller the unit, the more iterations they need to cover a given length.

4. Describing and analyzing shapes

Students describe and analyze shapes by examining their sides and angles. Students investigate, describe, and reason about decomposing and combining shapes to make other shapes. Through building, drawing, and analyzing two- and three-dimensional shapes, students develop a foundation for understanding attributes of two- and three-dimensional shapes, students develop a foundation for understanding area, volume, congruence, similarity, and symmetry in later grades.

Domain: Operations and Algebraic Thinking 2.OA

Cluster: Represent and solve problems involving addition and subtraction.

1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations within a cultural context, including those of Montana American Indians, of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. *(Note: See Glossary, Table 1.)*
   (Whenever possible, use real world problems involving Montana American Indians)
   - I can use addition and subtraction within 100 to solve one- and two- step word problems to find an unknown number.
   - I can use drawings and equations to solve the unknown number in a problem.

Cluster: Add and subtract within 20.

2. Fluently add and subtract within 20 using mental strategies. (*Note: Explanations may be supported by drawings or objects.)*
   By end of Grade 2, know from memory all sums of two one-digit numbers.
   - I can add and subtract within 20 using mental strategies.
   - I can know from memory the sum of two one-digit numbers.

Cluster: Work with equal groups of objects to gain foundations for multiplication.

3. Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.
   - I can determine if a group of objects (up to 20) is odd or even.
   - I can write an equation in which the sum is even using two equal addends.

4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.
   - I can define the meaning of an array.
   - I can write an equation to represent the given array.

Cluster: Understand place value.

1. Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones. Understand the following as special cases:
   a. 100 can be thought of as a bundle of ten tens — called a "hundred."
   b. The numbers 100, 200, 300, 400, 500, 600, 700, 800, 900 refer to one, two, three, four, five, six, seven, eight, or nine hundreds (and 0 tens and 0 ones).
   - I can identify the place value of ones, tens, hundreds.
   - I can identify how many ones are in a ten.
   - I can identify how many tens are in a hundred.

2. Count within 1000; skip-count by 5s, 10s, and 100s.
   - I can count to 1000 by 5s, 10s, 100s.
   - I can skip count starting with various numbers within 100.

3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
   - I can read and write numbers to 1000 using base-ten numerals.
   - I can read and write number names to 1000.
   - I can show a number in expanded form to 1000.

4. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons.
   - I can use >, <, and = to compare numbers

Cluster: Use place value understanding and properties of operations to add and subtract.

5. Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.
   - I can fluently add and subtract numbers to 100 without regrouping using various strategies.
   - I can fluently add and subtract numbers to 100 with regrouping using various strategies. .
   - I can show the relationship between addition and subtraction (note: subtraction is the inverse of addition).

6. Add up to four two-digit numbers using strategies based on place value and properties of operations.
   - I can add up to four two-digit numbers using various strategies.

7. Add and subtract within 1000, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds.
   - I can add and subtract to 1000 using concrete models, drawings, and strategies based on place value.
   - I can support my strategy through writing (note: journal, poster).

8. Mentally add 10 or 100 to a given number 100–900, and mentally subtract 10 or 100 from a given number 100–900.
   - I can mentally add 10 or 100 to a given number 100-900.
   - I can mentally subtract 10 or 100 from a given number 100-900.

9. Explain why addition and subtraction strategies work, using place value and the properties of operations. *(Note: Explanations may be supported by drawings or objects.)*
   - I can explain why addition and subtraction strategies work using a proof drawing.

Domain: Measurement and Data 2.MD

Cluster: Measure and estimate lengths in standard units.

1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
   - I can measure objects with appropriate tools.

2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.
   - I can measure objects using two different units of measurement.
   - I can relate the two measurements.

3. Estimate lengths using units of inches, feet, centimeters, and meters.
   - I can estimate lengths of objects using inches, feet, centimeters, and meters.

4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.
   - I can choose a measurement tool, compare two objects and determine the difference in their lengths.

Cluster: Relate addition and subtraction to length.

5. Use addition and subtraction within 100 to solve word problems within a cultural context, including those of Montana American Indians, involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem.
   (Whenever possible, use real world problems involving Montana American Indians)
   - I can use addition and subtraction to solve word problems involving length.
   - I can use drawings to solve word problems involving length.
   - I can use equations to solve for an unknown number.

6. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, ..., and represent whole-number sums and differences within 100 on a number line diagram.
   - I can draw a number line and label whole numbers as lengths from 0-100.
   - I can find the sum or difference using my number line 0-100.

Cluster: Work with time and money.

7. Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.
   - I can tell time to the nearest 5 minutes using analog and digital clocks.
   - I can tell the difference between a.m. and p.m.
8. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately. *Example: If you have 2 dimes and 3 pennies, how many cents do you have?*
   - I can solve word problems using dollar bills, quarters, dimes, nickels, and pennies.
   - I can use $ (dollar) and ¢ (cent) signs properly.

Cluster: Represent and interpret data.

9. Generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object. Show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units.
   - I can gather measurements to the nearest whole unit to create data.
   - I can make a horizontal scale using measurement data.

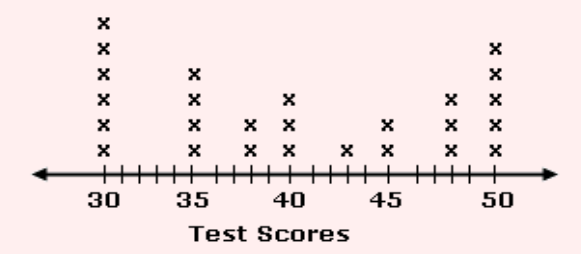
Line Plot

Definition of Line Plot

A line plot shows data on a number line with x or other marks to show frequency.

Examples of Line Plot

The line plot below shows the test scores of 26 students.



The count of cross marks above each score represents the number of students who obtained the respective score.

10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set from a variety of cultural contexts, including those of Montana American Indians, with up to four categories. Solve simple put-together, take-apart, and compare problems. *(Note: See Glossary, Table 1)* using information presented in a bar graph.
    (Whenever possible use real world problems involving Montana American Indians.)
    - I can create a picture and bar graph to represent data.
    - I can use data from graphs to solve problems (note: addition, subtraction, equal to).

Cluster: Reason with shapes and their attributes.

1. Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces. *(Note: See Glossary, Table 1)*
   Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
   - I can identify triangles, quadrilaterals, pentagons, hexagons, and cubes.
   - I can draw and create shapes with a given number of angles and sides.

2. Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.
   - I can divide a rectangle into rows and columns creating same size squares. This is called finding the area.
   - I can determine the area by counting the same size squares within a given rectangle.

3. Partition circles and rectangles into two, three, or four equal shares, describe the shares using the words halves, thirds, half of, a third of, etc., and describe the whole as two halves, three thirds, four fourths. Recognize that equal shares of identical wholes need not have the same shape.
   - I can divide circles and rectangles into 2, 3, or 4 equal parts.
   - I can use words like half, halves, thirds, fourths.
   - I can show that equal parts of identical wholes may not have the same shape.

[1] See Glossary, Table 1.
[2] See standard 1.OA.6 for a list of mental strategies.
[3] Explanations may be supported by drawings or objects
[4] See Glossary, Table 1

Standards	Explanations and Examples
Students are expected to:	The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.
2.MP.1. Make sense of problems and persevere in solving them.	In second grade, students realize that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. They may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They make conjectures about the solution and plan out a problem-solving approach.
2.MP.2. Reason abstractly and quantitatively.	Younger students recognize that a number represents a specific quantity. They connect the quantity to written symbols. Quantitative reasoning entails creating a representation of a problem while attending to the meanings of the quantities. Second graders begin to know and use different properties of operations and relate addition and subtraction to length.
2.MP.3. Construct viable arguments and critique the reasoning of others.	Second graders may construct arguments using concrete referents, such as objects, pictures, drawings, and actions. They practice their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?", "Explain your thinking," and "Why is that true?" They not only explain their own thinking, but listen to others' explanations. They decide if the explanations make sense and ask appropriate questions.
2.MP.4. Model with mathematics.	In early grades, students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using

	objects, acting out, making a chart or list, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed.
2.MP.5. Use appropriate tools strategically.	In second grade, students consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be better suited. For instance, second graders may decide to solve a problem by drawing a picture rather than writing an equation.
2.MP.6. Attend to precision.	As children begin to develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and when they explain their own reasoning.
2.MP.7. Look for and make use of structure.	Second graders look for patterns. For instance, they adopt mental math strategies based on patterns (making ten, fact families, doubles).
2.MP.8. Look for and express regularity in repeated reasoning.	Students notice repetitive actions in counting and computation, etc. When children have multiple opportunities to add and subtract, they look for shortcuts, such as rounding up and then adjusting the answer to compensate for the rounding. Students continually check their work by asking themselves, "Does this make sense?"

Standard	Grade 2 Montana Common Core Standards Vocabulary
2.OA.1	none
2.OA.2	none
2.OA.3	odd, even
2.OA.4	rectangular array, addends
2.NBT.1	place value
2.NBT.2	none
2.NBT.3	expanded form
2.NBT.4	>, <, =
2.NBT.5	place value, commutative property, associative property, identity property
2.NBT.6	place value, commutative property, associative property, identity property
2.NBT.7	place value, commutative property, associative property, identity property, compose, decompose
2.NBT.8	none
2.NBT.9	place value, commutative property, associative property, identity property
2.MD.1	length
2.MD.2	length, unit
2.MD.3	length, unit
2.MD.4	length, unit
2.MD.5	length, unit
2.MD.6	length, unit, number line diagram, sums, differences
2.MD.7	analog clock, digital clock, a.m., p.m.
2.MD.8	dollars ($), cents (¢), quarters, dimes, nickels, and pennies
2.MD.9	length, unit, line plot, scale
2.G.1	attribute, quadrilateral, rectangle, rhombus, square, parallelogram, trapezoid, kite
2.G.2	area, unit fraction

GRADE 3 MATHEMATICS

Overview:

Domains	Operations and Algebraic Thinking	Number & Operations in Base Ten	Number & Operations: *Fractions*	Measurement and Data	Geometry
Clusters	• Represent and solve problems involving multiplication and division • Understand properties of multiplication and the relationship between multiplication and division • Multiply and divide within 100 • Solve problems involving the four operations, and identify and explain patterns in arithmetic	• Use place value understanding and properties of operations to perform multi-digit arithmetic	• Develop understanding of fractions as numbers	• Solve problems involving measurement and estimation of intervals of time, liquid, volumes and masses of objects • Represent and interpret data • Geometric measurement: understand concepts of area and relate area to multiplication and to addition • Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures	• Reason with shapes and their attributes

Mathematical Practices	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively.	3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.	5. Use appropriate tools strategically. 6. Attend to precision.	7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Major Interdisciplinary Grade 3 Units	<u>English Language Arts: across the content areas</u> • Reading • Writing • Speaking & Listening • Language	<u>Indian Education for All Titles</u> • *Beaver Steals Fire* by Confederated Salish/Kootenai Tribes • *War Shirt* by Bently Spang • *When the Shadbush Blooms* by Carla Messinger	<u>Science</u> • Geology: Earth Materials and Changes • Weather and the Water Cycle • Simple Machines	<u>Social Studies Community and Change:</u> • Our Community and Its Heritage • Comparing Past to Present • Meeting Ordinary and Extraordinary People

In Grade 3, instructional time should focus on four critical areas (note: multiplication, division, and fractions are the most important developments):

1. Developing understanding of multiplication and division and strategies for multiplication and division within 100

   Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.

2. Developing understanding of fractions, especially unit fractions (fractions with numerator 1)

Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket; but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.

3. Developing understanding of the structure of rectangular arrays and of area

Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.

4. Describing and analyzing two-dimensional shapes

Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

Domain: Operations and Algebraic Thinking 3.OA

Cluster: Represent and solve problems involving multiplication and division.

1. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5×7.*
    - I can explain products of whole numbers as the total number of objects in a number of groups.

2. Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.*
    - I can explain whole number quotients as the number of objects in each group when a whole number is partitioned equally.

3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. *(Note: See Glossary, Table 2.)*
    - I can use drawings and equations to solve multiplication and division word problems involving equal groups, arrays, and measurement quantities or units of measurement.

4. Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?*
    - I can describe, using examples, that multiplication and division are inverse operations or that they are related.
    - I can solve for an unknown whole number in a multiplication and division equation.

Cluster: Understand properties of multiplication and the relationship between multiplication and division.

5. Apply properties of operations as strategies to multiply and divide. *(Note: Students need not use formal terms for these properties.) Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*
    - I can apply properties of operations as strategies to multiply and divide.

6. Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8.*
    - I can solve division problems with unknown factors, using multiplication.

Cluster: Multiply and divide within 100.

7. Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.
    - I can fluently recall multiplication and division facts within 100 using the properties of operations.
    - I can master my multiplication and division facts within 100 by the end of Grade 3.

Cluster: Solve problems involving the four operations, and identify and explain patterns in arithmetic.

8. Solve two-step word problems using the four operations within cultural contexts, including those of Montana American Indians. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. *(Note: This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order.*
    - I can solve two-step word problems using the four operations.
    - I can represent an unknown quantity in an equation with a variable.

- I can decide if an answer is reasonable using estimation.

9. Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*
   - I can demonstrate my understanding of arithmetic patterns using the properties of operations.

Domain: Number and Operations in Base Ten — 3.NBT

Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.

(Note: A range of algorithms may be used.)

1. Use place value understanding to round whole numbers to the nearest 10 or 100.
   - I can round whole numbers to the nearest 10 or 100.

2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
   - I can fluently add and subtract within 1000.

3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9×80, 5×60) using strategies based on place value and properties of operations.
   - I can multiply one- digit whole numbers by multiples of 10 in the range 10- 90.

Number and Operations—Fractions — 3.NF

(Note: Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, 8.)

Cluster: Develop understanding of fractions as numbers.

1. Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.
   - I can identify the parts of a fraction and explain their meanings.

2. Understand a fraction as a number on the number line; represent fractions on a number line diagram.
   a. Represent a fraction $1/b$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $1/b$ and that the endpoint of the part based at 0 locates the number $1/b$ on the number line.
      - I can explain how a fraction is a number on a number line.
      - I can represent fractions on a number line.
      - I can divide a number line into equal intervals (parts) to represent fractions.
   b. Represent a fraction a/b on a number line diagram by marking off a lengths $1/b$ from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.
      - I can place fractions on a number line that is divided into equal intervals.

3. Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
   - I can show two fractions as equivalent (equal) if they are the same size.
   - I can show two fractions as equivalent (equal) if they are on the same point on a number line.

b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3. Explain why the fractions are equivalent, e.g., by using a visual fraction model.
   - I can recognize and generate simple equivalent fractions.
   - I can justify why fractions are equivalent.

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.*
   - I can express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
   - I can compare fractions with the same numerator.
   - I can compare fractions with the same denominator.
   - I can use >, <, = symbols to justify my conclusions when I compare fractions.

Domain: Measurement and Data 3.MD

Cluster: Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

1. Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.
   - I can tell and write time to the nearest minute.
   - I can solve word problems involving addition and subtraction of time intervals in minutes.

2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (Note: Excludes multiplicative comparison problems (problems involving notions of "times as much"; see Glossary, Table 2). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (*Note: Excludes compound units such as cm3 and finding the geometric volume of a container.)*
   - I can measure liquid volumes and masses of objects using grams, kilograms, and liters.
   - I can estimate liquid volumes and masses of objects using grams, kilograms, and liters.
   - I can add, subtract, multiply, or divide to solve word problems involving masses or volumes in the same units.

Cluster: Represent and interpret data.

3. Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories, within cultural contexts, including those of Montana American Indians. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*
   - I can draw a picture graph to represent a set of data.
   - I can create a bar graph to represent a set of data.
   - I can solve one- and two- step "how many more" and "how many less" problems from a bar graph.

4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.
   - I can measure and record lengths to the nearest half and fourth of an inch.
   - I can use measurement data to make a horizontal line plot, which is marked off in appropriate units.

Cluster: Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

5. Recognize area as an attribute of plane figures and understand concepts of area measurement.
   a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
      - I can use square units to measure area.
   b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.
      - I can label area with square units.

6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).
   - I can measure area by counting unit squares.

7. Relate area to the operations of multiplication and addition.
   a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.
      - I can use tiles to find the area of a rectangle.
      - I can multiply the side lengths to find the area of a rectangle.
   b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.
      - I can solve real world problems incorporating area.
   c. Products as rectangular areas in mathematical reasoning. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.
      - I can use tiles to make the area of a rectangle.

- I can represent the distributive property using this model.

d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems, including those of Montana American Indians.
   - I can find the area of irregular figures by adding the areas of smaller rectangles within the figure.
   - I can apply the area of irregular figures in real world settings.

Cluster: Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

8. Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.
   - I can solve real world and mathematical problems involving perimeter and area of polygons.

Domain: Geometry 3.G

Cluster: Reason with shapes and their attributes.

1. Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.
   - I can classify shapes by their attributes.
   - I can identify the attributes that make a rhombus, rectangle, and a square quadrilateral.
   - I can draw examples of quadrilaterals that are not rhombuses, rectangles, and squares.

2. Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*
   - I can divide shapes into equal areas.
   - I can write the area of each part of a shape as a fraction.

Standards	Explanations and Examples
Students are expected to:	The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.
3.MP.1. Make sense of problems and persevere in solving them.	In third grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Third graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.
3.MP.2. Reason abstractly and quantitatively.	Third graders should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities.
3.MP.3. Construct viable arguments and critique the reasoning of others.	In third grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.
3.MP.4. Model with mathematics.	Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, acting out, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Third graders should evaluate their results in the context of the situation and reflect on whether the results make sense.
3.MP.5. Use appropriate tools strategically.	Third graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper to find all the possible rectangles that have a given perimeter. They compile the possibilities into an organized list or a table, and determine whether they have all the possible rectangles.
3.MP.6. Attend to precision.	As third graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the area of a rectangle they record their answers in square units.
3.MP.7. Look for and make use of structure.	In third grade, students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to multiply and divide (commutative and distributive properties).
3.MP.8. Look for and express regularity in repeated reasoning.	Students in third grade should notice repetitive actions in computation and look for more shortcut methods. For example, students may use the distributive property as a strategy for using products they know to solve products that they don't know. For example, if students are asked to find the product of 7 x 8, they might decompose 7 into 5 and 2 and then multiply 5 x 8 and 2 x 8 to arrive at 40 + 16 or 56. In addition, third graders continually evaluate their work by asking themselves, "Does this make sense?"

Standard	Grade 3 Montana Common Core Standards Vocabulary
3.OA.1	multiplication, factor, product
3.OA.2	division, dividend, divisor, quotient
3.OA.3	multiplication, division, array, equation
3.OA.4	multiplication, division, equation
3.OA.5	multiplication, division, commutative property, associative property, distributive property
3.OA.6	multiplication, division, factor
3.OA.7	multiplication, division, commutative property, associative property, distributive property
3.OA.8	order of operations, estimation, rounding
3.OA.9	arithmetic pattern
3.NBT.1	place value, rounding
3.NBT.2	place value, algorithm
3.NBT.3	place value, multiply
3.NF.1	fraction, unit fraction, numerator, denominator
3.NF.2	fraction, unit fraction, numerator, denominator, number line
3.NF.3	fraction, unit fraction, numerator, denominator, equivalent
3.MD.1	minute, number line
3.MD.2	volume, mass, standard units
3.MD.3	scaled picture graph, sealed bar graph
3.MD.4	line plot, scale, half/halves, quarter, fourth
3.MD.5	area, plane figure, unit square
3.MD.6	area, unit square
3.MD.7	area, area model, distributive property, additive
3.MD.8	perimeter, area
3.G.1	attribute, quadrilateral, rectangle, rhombus, square, parallelogram, trapezoid, kite
3.G.2	area, unit fraction

GRADE 4 MATHEMATICS

Overview:

Domains	Operations and Algebraic Thinking	Number & Operations in Base Ten	Number & Operations: *Fractions*	Measurement and Data	Geometry
Clusters	• Use the four operations with whole numbers to solve problems • Gain familiarity with factors and multiples • Generate and analyze patterns	• Generalize place value understanding for multi-digit whole numbers • Use place value understanding and properties of operations to perform multi-digit arithmetic	• Extend understanding of fraction equivalence and ordering • Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers • Understand decimal notation for fractions, and compare decimal fractions	• Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit • Represent and interpret data • Geometric measurement: understand concepts of angle and measure angles	• Draw and identify lines and angles, and classify shapes by properties of their lines and angles

Mathematical Practices	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively.	3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.	5. Use appropriate tools strategically. 6. Attend to precision.	7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Major Interdisciplinary Grade 4 Units	<u>English Language Arts: across the content areas</u> • Reading • Writing • Speaking & Listening • Language	<u>Indian Education for All Titles</u> • *Less Than Half, More Than Whole* by Kathleen Lacapa • *Powwow* by George Ancona • *Shi-shi-etko* by Nicola L. Campbell	<u>Science</u> • Energy: Heat, Light, and Sound • Energy: Electricity and Magnetism • Local Ecosystems: Plant and Animal Interactions-Adaptations and Behavior	<u>Social Studies Montana and Regions of the United States:</u> • Learning Geography Skills • Learning About Our State and Region • Becoming Effective Citizens

In Grade 4, instructional time should focus on three critical areas:

1. Developing understanding and fluency with multi-digit multiplication, and developing understanding of dividing to find quotients involving multi-digit dividends
   Students generalize their understanding of place value to 1,000,000, understanding the relative sizes of numbers in each place. They apply their understanding of models for multiplication (equal-sized groups, arrays, area models), place value, and properties of operations, in particular the distributive property, as they develop, discuss, and use efficient, accurate, and generalizable methods to compute products of multi-digit whole numbers. Depending on the numbers and the context, they select and accurately apply appropriate methods to estimate or mentally calculate products. They develop fluency with efficient procedures for multiplying whole numbers; understand and explain why the procedures work based on place value and properties of operations; and use them to solve problems. Students apply their understanding of models for division, place value, properties of operations, and the relationship of division to multiplication as they develop, discuss, and use efficient, accurate, and generalizable procedures to find quotients involving multi-digit dividends. They select and accurately apply appropriate methods to estimate and mentally calculate quotients, and interpret remainders based upon the context.

2. Developing an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, multiplication of fractions by whole numbers
   Students develop understanding of fraction equivalence and operations with fractions. They recognize that two different fractions can be equal (e.g., 15/9 = 5/3), and they develop methods for generating and recognizing equivalent fractions. Students extend previous understandings about how fractions are built from unit fractions, composing fractions from unit fractions, decomposing fractions into unit fractions, and using the meaning of fractions and the meaning of multiplication to multiply a fraction by a whole number.

3. Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry
   Students describe, analyze, compare, and classify two-dimensional shapes. Through building, drawing, and analyzing two-dimensional shapes, students deepen their understanding of properties of two-dimensional objects and the use of them to solve problems involving symmetry.

Domain: Operations and Algebraic Thinking 4.OA

Cluster: Use the four operations with whole numbers to solve problems.

1. Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.
   - I can interpret a multiplication equation as a comparison, *e.g. Lucy has 35 cookies. Ben has 7 cookies. Lucy has 5 times as many cookies as Ben. (situation/solution equations)*
   - I can represent verbal statements of multiplication comparisons as equations.

2. Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison. *(Note: See Glossary, Table 2.)*
   - I can multiply or divide to solve word problems involving multiplicative comparison. For example, A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat costs? a * ? = p, and p / a = ?
   - I can distinguish between multiplication and addition comparison problems.

3. Solve multi-step word problems within cultural contexts, including those of Montana American Indians, with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.
   - I can solve multi-step word problems using whole numbers and all four operations.
   - I can interpret a remainder as a whole number, a fraction, or a decimal.
   - I can solve these equations with an unknown variable.
   - I can check my solutions using mental math, estimation, or rounding.

Cluster: Gain familiarity with factors and multiples.

4. Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.
   - I can identify factor pairs or multiples for all whole numbers from 1 to 100.
   - I can identify a prime or composite number 1 to 100.

Cluster: Generate and analyze patterns.

5. Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself. *For example, given the rule "Add 3" and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers. Explain informally why the numbers will continue to alternate in this way.*
   - I can create a number or shape pattern and state its rule.
   - I can explain my pattern to a given rule.

Domain: Number and Operations in Base Ten 4.NBT

Grade 4 expectations in this domain are limited to whole numbers less than or equal to 1,000,000

Cluster: Generalize place value understanding for multi-digit whole numbers.

1. Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. *For example, recognize that 700 ÷ 70 = 10 by applying concepts of place value and division.*
   - I can recognize multiples of ten in multi-digit numbers when multiplying and dividing.

2. Read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form. Compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
   - I can read and write multi-digit whole numbers in expanded form, base ten numerals, and number names.
   - I can compare two multi- digit numbers using >, =, and < symbols (inequalities).

3. Use place value understanding to round multi-digit whole numbers to any place.
   - I can round any multi-digit number.

Cluster: Use place value understanding and properties of operations to perform multi-digit arithmetic.

4. Fluently add and subtract multi-digit whole numbers using the standard algorithm.
   - I can add and subtract multi-digit whole numbers using the standard algorithm.

5. Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
   - I can illustrate, multiply and explain a four-digit number by a one-digit whole number using an equation, an array, or area model.

- I can multiply, illustrate, and explain a four digit number by a two- digit whole number using an equation, an array or area model.

6. Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
- I can divide, illustrate, and explain a division problem with a four-digit dividend by a one-digit divisor where the quotient has a remainder using an equation, an array, or area model.
- I can recognize the distributive, associative, commutative, or identity properties, and order of operations when doing division problems.
- I can find a quotient using an equation, array or area model.

Domain: Number and Operations—Fractions 4.NF

Grade 4 expectations in this domain are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, 100.

Cluster: Extend understanding of fraction equivalence and ordering.

1. Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
- I can produce equivalent fractions with visual models.

2. Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as 1/2. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.
- I can find a common denominator.
- I can compare fractions using >, =, < (inequalities and equalities).

Cluster: Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.

3. Understand a fraction a/b with $a > 1$ as a sum of fractions $1/b$.
   a. Understand addition and subtraction of fractions as joining and separating parts referring to the same whole.
   - I can add unit fractions.
   - I can add or subtract fractions with like denominators.
   b. Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording each decomposition by an equation. Justify decompositions, e.g., by using a visual fraction model. *Examples: 3/8 = 1/8 + 1/8 + 1/8 ; 3/8 = 1/8 + 2/8 ; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.*
   - I can decompose a fraction or a mixed number into its smaller parts more than one way, e.g., ⅜ = ⅛ + ⅛ + ⅛ ; 2 ⅛ = 8/8 + 8/8 + ⅛

c. Add and subtract mixed numbers with like denominators, e.g., by replacing each mixed number with an equivalent fraction, and/or by using properties of operations and the relationship between addition and subtraction.
- I can add and subtract improper fractions with like denominators.

d. Solve word problems within cultural contexts, including those of Montana American Indians, involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.
- I can add and subtract fractions to solve word problems involving by implementing visual models and/or equations.

4. Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.
   a. Understand a fraction a/b as a multiple of $1/b$. *For example, use a visual fraction model to represent 5/4 as the product 5 × (1/4), recording the conclusion by the equation 5/4 = 5 × (1/4).*
   - I can multiply a fraction by a whole number.
   - I can demonstrate a fraction of a whole with a visual model.

   b. Understand a multiple of a/b as a multiple of $1/b$, and use this understanding to multiply a fraction by a whole number. *For example, use a visual fraction model to express 3 × (2/5) as 6 × (1/5), recognizing this product as 6/5. (In general, n × (a/b) = (n × a)/b.)*
   - I can demonstrate the associative property when multiplying a whole number by a fraction.

   c. Solve word problems within cultural contexts, including those of Montana American Indians, involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem. *For example, if each person at a party will eat 3/8 of a pound of roast beef, and there will be 5 people at the party, how many pounds of roast beef will be needed? Between what two whole numbers does your answer lie? As a contemporary American Indian example, for family/cultural gatherings the Canadian and Montana Cree bake bannock made from flour, salt, grease, and baking soda, in addition to ¾ cup water per pan. When making four pans, how much water will be needed?*
   - I can interpret a word problem that involves multiplication of a fraction by a whole number.

Cluster: Understand decimal notation for fractions, and compare decimal fractions.

5. Express a fraction with denominator 10 as an equivalent fraction with denominator 100, and use this technique to add two fractions with respective denominators 10 and 100. *Students who can generate equivalent fractions can develop strategies for adding fractions with unlike denominators in general. But addition and subtraction with unlike denominators in general is not a requirement at this grade. For example, express 3/10 as 30/100, and add 3/10 + 4/100 = 34/100.*
   - I can generate equivalent fractions where the denominators are multiples of 10.

6. Use decimal notation for fractions with denominators 10 or 100. *For example, rewrite 0.62 as 62/100; describe a length as 0.62 meters; locate 0.62 on a number line diagram.*
   - I can convert fractions with denominators that are multiples of 10 into decimals.
   - I can compare an equivalent fraction to its corresponding decimal.

7. Compare two decimals to hundredths by reasoning about their size. Recognize that comparisons are valid only when the two decimals refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual model.
   - I can compare, using inequalities or equalities, two decimals to the hundredths place using a visual model.

Domain: Measurement and Data 4.MD

Cluster: Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit.

1. Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. *For example, know that 1 ft is 12 times as long as 1 in. Express the length of a 4 ft snake as 48 in. Generate a conversion table for feet and inches listing the number pairs (1, 12), (2, 24), (3, 36)...*
   - I can explain customary and metric units of measure.
   - I can generate a conversion table for customary and metric units of measure.
   - I can explain the units of time.

2. Use the four operations to solve word problems within cultural contexts, including those of Montana American Indians, involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale.
   - I can solve word problems using the four operations involving units of measurement, such as intervals of time, volume, mass, distance, and money.
   - I can create a diagram that features quantities of measurement.
   - I can show measurement in fraction and decimal form.

3. Apply the area and perimeter formulas for rectangles in real world and mathematical problems. *For example, find the width of a rectangular room given the area of the flooring and the length, by viewing the area formula as a multiplication equation with an unknown factor.*
   - I can apply my knowledge of area and/or perimeter to real world situations.

Cluster: Represent and interpret data.

4. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Solve problems involving addition and subtraction of fractions by using information presented in line plots. *For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect or arrow/spearhead collection.*

- I can create a line plot showing fractional units
- I can solve problems with a line plot showing fractional units.

Cluster: Geometric measurement: understand concepts of angle and measure angles.

5. Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement:
   a. An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where the two rays intersect the circle. An angle that turns through 1/360 of a circle is called a "one-degree angle," and can be used to measure angles.
   - I can recognize and measure angles.
   - I can demonstrate angles of degrees in a circle.

   b. An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
   - I can interpret the measurement of an angle.

6. Measure angles in whole-number degrees using a protractor. Sketch angles of specified measure.
   - I can create a specific angle using a protractor.
   - I can measure a specific angle using a protractor.

7. Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world and mathematical problems, e.g., by using an equation with a symbol for the unknown angle measure.
   - I can manipulate two non-overlapping angles into a larger angle.
   - I can use addition and subtraction to find an unknown angle in a real world situation.

Domain: Geometry 4.G

Cluster: Draw and identify lines and angles, and classify shapes by properties of their lines and angles.

1. Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures.
   - I can create and identify points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines.

2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles.
   - I can classify two-dimensional figures based on the attributes of the figures. i.e.: parallel and perpendicular lines, angles.
   - I can identify a right triangle.

3. Recognize a line of symmetry for a two-dimensional figure, including those found in Montana American Indian designs, as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.
   - I can recognize lines of symmetry of two-dimensional figures.
   - I can design or draw a two-dimensional figure using lines of symmetry.

Standards	Explanations and Examples
Students are expected to:	The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.
4.MP.1. Make sense of problems and persevere in solving them.	In fourth grade, students know that doing mathematics involves solving problems and discussing how they solved them. Students explain to themselves the meaning of a problem and look for ways to solve it. Fourth graders may use concrete objects or pictures to help them conceptualize and solve problems. They may check their thinking by asking themselves, "Does this make sense?" They listen to the strategies of others and will try different approaches. They often will use another method to check their answers.
4.MP.2. Reason abstractly and quantitatively.	Fourth graders should recognize that a number represents a specific quantity. They connect the quantity to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions, record calculations with numbers, and represent or round numbers using place value concepts.
4.MP.3. Construct viable arguments and critique the reasoning of others.	In fourth grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain their thinking and make connections between models and equations. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.
4.MP.4. Model with mathematics.	Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fourth graders should evaluate their results in the context of the situation and reflect on whether the results make sense.
4.MP.5. Use appropriate tools strategically.	Fourth graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use graph paper or a number line to represent and compare decimals and protractors to measure angles. They use other measurement tools to understand the relative size of units within a system and express measurements given in larger units in terms of smaller units.
4.MP.6. Attend to precision.	As fourth graders develop their mathematical communication skills, they try to use clear and precise language in their discussions with others and in their own reasoning. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, they use appropriate labels when creating a line plot.
4.MP.7. Look for and make use of structure.	In fourth grade, students look closely to discover a pattern or structure. For instance, students use properties of operations to explain calculations (partial products model). They relate representations of counting problems such as tree diagrams and arrays to the multiplication principal of counting. They generate number or shape patterns that follow a given rule.
4.MP.8. Look for and express regularity in repeated reasoning.	Students in fourth grade should notice repetitive actions in computation to make generalizations Students use models to explain calculations and understand how algorithms work. They also use models to examine patterns and generate their own algorithms. For example, students use visual fraction models to write equivalent fractions.

Grade 4 Montana Common Core Standards Vocabulary		
acute angle	equivalent fraction	Order of Operations
area	estimation	parallel lines
area model	expanded form	perimeter
array	factor pair	perpendicular lines
Associative Property	factors	place value form
Commutative Property	hundredths	point
compose	Identity Property	prime number
composite number	improper fraction	product
congruent	inequalities <, =, >	quotient
customary measurement	line	rays
decimal point	line plot	remainder
decompose	line segments	right angle
degrees of an angle	mass	rounding
denominator	metric measurement	sets of
difference	mixed number	standard form
Distributive Property	multiples	sum
dividend	multiplicative comparison, i.e... as many as	symmetry
divisor	numerator	tenths
end point	obtuse angle	variables
equation	operations	volume

GRADE 5 MATHEMATICS

Overview:

Domains	Operations and Algebraic Thinking	Number & Operations in Base Ten	Number & Operations: *Fractions*	Measurement and Data	Geometry
Clusters	• Write and interpret numerical expressions • Analyze patterns and relationships	• Understand the place value system • Perform operations with multi-digit whole numbers and with decimals to hundredths	• Use equivalent fractions as a strategy to add and subtract fractions • Apply and extend previous understandings of multiplication and division to multiply and divide fractions	• Convert like measurement units within a given measurement system • Represent and interpret data • Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition	• Graph points on the coordinate plane to solve real-world and mathematical problems • Classify two-dimensional figures into categories based on their properties
Mathematical Practices	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively.	3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics.		5. Use appropriate tools strategically. 6. Attend to precision.	7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Major Interdisciplinary Grade 5 Units	English Language Arts: across the content areas • Reading • Writing • Speaking & Listening • Language	Indian Education for All Titles • *Arrow Over the Door* by Joseph Bruchac • *Navajo Long Walk* by Joseph Bruchac • *A New Look at Thanksgiving* by Catherine O'Neill Grace		Science • Using Variables in the Inquiry Process • Astronomy: Earth, Sun, Moon, Planets (Solar System), and Beyond • Elements and Compounds	Social Studies United States History and Geography – Beginnings to 1850: • Pre-Columbian America • Age of Exploration • American Indians • Settling Colonies • Causes of the American Revolution • War of Independence • Constitution • Life in the Young Republic and Westward Expansion

In Grade 5, instructional time should focus on three critical areas:

1. Developing fluency with addition and subtraction of fractions, developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions)
   Students apply their understanding of fractions and fraction models to represent the addition and subtraction of fractions with unlike denominators as equivalent calculations with like denominators. They develop fluency in calculating sums and differences of fractions, and make reasonable estimates of them. Students also use the meaning of fractions, of multiplication and division, and the relationship between multiplication and division to understand and explain why the procedures for multiplying and dividing fractions make sense. (Note: this is limited to the case of dividing unit fractions by whole numbers and whole numbers by unit fractions.)

2. Extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operation
   Students develop understanding of why division procedures work based on the meaning of base-ten numerals and properties of operations. They finalize fluency with multi-digit addition,

subtraction, multiplication, and division. They apply their understandings of models for decimals, decimal notation, and properties of operations to add and subtract decimals to hundredths. They develop fluency in these computations, and make reasonable estimates of their results. Students use the relationship between decimals and fractions, as well as the relationship between finite decimals and whole numbers (i.e., a finite decimal multiplied by an appropriate power of 10 is a whole number), to understand and explain why the procedures for multiplying and dividing finite decimals make sense. They compute products and quotients of decimals to hundredths efficiently and accurately.

3. Developing understanding of volume

Students recognize volume as an attribute of three-dimensional space. They understand that volume can be quantified by finding the total number of same-size units of volume required to fill the space without gaps or overlaps. They understand that a 1-unit by 1-unit by 1-unit cube is the standard unit for measuring volume. They select appropriate units, strategies, and tools for solving problems that involve estimating and measuring volume. They decompose three-dimensional shapes and find volumes of right rectangular prisms by viewing them as decomposed into layers of arrays of cubes. They measure necessary attributes of shapes in order to solve real world and mathematical problems.

Domain: Operations and Algebraic Thinking 5.OA

Cluster: Write and interpret numerical expressions.

1. Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
   - I can evaluate expressions using parentheses, brackets, or braces.

2. Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product.*
   - I can write and interpret numerical expressions.

Cluster: Analyze patterns and relationships.

3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. *For example, given the rule "Add 3" and the starting number 0, and given the rule "Add 6" and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.*
   - I can generate two different numerical patterns given two different rules.
   - I can identify and explain the relationships between the terms.
   - I can graph the ordered pairs from these terms on a coordinate plane.

Cluster: Understand the place value system.

1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.
   - I can explain that moving one place value to the left, that digit increases by ten times the value.
   - I can explain that moving one place value to the right, the digit has 1/10 the value.

2. Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
   - I can explain patterns of zeros and placement of decimal points when I multiply by powers of ten.
   - I can use exponents to demonstrate the powers of ten.

3. Read, write, and compare decimals to thousandths.
   a. Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$.
   - I can read, write, and compare decimals to thousandths using numerals, number names, and expanded form.

   a. Compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons.
   - I can compare two decimals to thousandths using >, =, and <.

4. Use place value understanding to round decimals to any place.
   - I can round decimals to any place.

Cluster: Perform operations with multi-digit whole numbers and with decimals to hundredths.

5. Fluently multiply multi-digit whole numbers using the standard algorithm.
   - I can multiply multi-digit whole numbers using the standard algorithm.

6. Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
   - I can find whole number quotients with four-digit dividends and two-digit divisors choosing from various strategies.

7. Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings within cultural contexts, including those of Montana American Indians, and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
   - I can add, subtract, multiply, and divide decimals to hundredths choosing from various strategies.
   - I can explain the reasoning behind my results.

Cluster: Use equivalent fractions as a strategy to add and subtract fractions.

1. Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators. *For example, 2/3 + 5/4 = 8/12 + 15/12 = 23/12. (In general, a/b + c/d = (ad + bc)/bd.)*
   - I can add and subtract fractions (including mixed numbers) with unlike denominators by finding equivalent fractions.

2. Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators, e.g., by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers. *For example, recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2.*
   - I can solve real-world word problems involving addition or subtractions of fractions.
   - I can use my understanding of fractions to recognize that my answer is reasonable.

Cluster: Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

3. Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers, e.g., by using visual fraction models or equations to represent the problem. *For example, interpret 3/4 as the result of dividing 3 by 4, noting that 3/4 multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size 3/4. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?*
   - I can understand that a fraction is division of the numerator by the denominator.
   - I can solve word problems involving division of whole numbers that result in answers of fractions or mixed numbers.

4. Apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction.
   a. Interpret the product $(a/b) \times q$ as a parts of a partition of q into b equal parts; equivalently, as the result of a sequence of operations $a \times q \div b$. *For example, use a visual fraction model to show (2/3) × 4 = 8/3, and create a story context for this equation within cultural contexts, including those of Montana American Indians. Do the same with (2/3) × (4/5) = 8/15. (In general, (a/b) × (c/d) = ac/bd.)*
      - I can multiply a fraction by a whole number or another fraction.
      - I can define the components and sequence of operations to multiply fractions.
   b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths, and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles, and represent fraction products as rectangular areas.
      - I can determine the area of a rectangle with fractional side lengths by tiling or using multiplication.

5. Interpret multiplication as scaling (resizing), by:
   a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
      - I can analyze the accuracy of a product based on comparison of the product with its factors.
   b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence $a/b = (n \times a)/(n \times b)$ to the effect of multiplying a/b by 1.
      - I can explain that a number multiplied by a fraction greater than one will have a greater product than that number.
      - I can explain that a number multiplied by a fraction less than one will have a smaller product than that number.
      - I can explain that a number multiplied by a fraction equal to one will stay the same (equivalent).

6. Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fraction models or equations to represent the problem within cultural contexts, including those of Montana American Indians.
   - I can use fraction models or equations to solve real-world word problems.

7. Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. [1] (*Note: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.*)
   a. Interpret division of a unit fraction by a non-zero whole number, and compute such quotients. *For example, create a story context within cultural contexts, including those of Montana American Indians, for (1/3) ÷ 4, and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that (1/3) ÷ 4 = 1/12 because (1/12) × 4 = 1/3.*
      - I can understand and divide a unit fraction by a whole number.
   b. Interpret division of a whole number by a unit fraction, and compute such quotients. *For example, create a story context within cultural contexts, including those of Montana American Indians, for 4 ÷ (1/5), and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that 4 ÷ (1/5) = 20 because 20 × (1/5) = 4.*
      - I can understand and divide a whole number by a unit fraction.
   c. Solve real world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions, e.g., by using visual fraction models and equations to represent the problem. *For example, how much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 1/3-cup servings are in 2 cups of raisins?*
      - I can apply my knowledge of dividing unit fractions by whole numbers and whole numbers by unit fractions to solve real-world problems.

Cluster: Convert like measurement units within a given measurement system.

1. Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems within a cultural context, including those of Montana American Indians.
   - I can convert units of different sizes within the same system.
   - I can apply a given measurement system to solve real-world problems.

Cluster: Represent and interpret data.

2. Make a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4, 1/8). Use operations on fractions for this grade to solve problems involving information presented in line plots. *For example, given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally.*
   - I can represent fractional units on a line plot.
   - I can use the data on a line plot to solve problems.

Cluster: Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
   a. A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.
   - I can define and measure volume based on a cubic unit.

   a. A solid figure which can be packed without gaps or overlaps using n unit cubes is said to have a volume of n cubic units.
   - I can use cubic units to measure volume.

4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.
   - I can measure volume by counting various cubic units.

5. Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
   a. Within cultural contexts, including those of Montana American Indians, find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.
   - I can find the volume of a rectangular prism using unit cubes or multiplication.

   b. Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.
   - I can apply the formula $V = l \times w \times h$ to find the volume of a rectangular prism.
   - I can apply the formula $V = b \times h$ to find the volume of a rectangular prism.

c. Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

- I can determine the volumes of two separate rectangular prisms and add them to find the total volume of the combined prisms.
- I can apply this technique to solve real-world problems.

Domain: Geometry 5.G

Cluster: Graph points on the coordinate plane to solve real-world and mathematical problems.

1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., *x*-axis and *x*-coordinate, *y*-axis and *y*-coordinate).
   - I can create a coordinate graph using two perpendicular lines called axes.
   - I can identify the origin as where the lines intersect and coincide with zero on each line.
   - I can plot an ordered pair in the coordinate plane.

2. Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation including those found in Montana American Indian designs.
   - I can represent and evaluate real-world problems by graphing in the first quadrant of the coordinate plane.

Cluster: Classify two-dimensional figures into categories based on their properties.

3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. *For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.*
   - I can identify the attributes of all two-dimensional figures within their subcategory.

4. Classify two-dimensional figures in a hierarchy based on properties.
   - I can classify two-dimensional figures based on their properties.

Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division. But division of a fraction by a fraction is not a requirement at this grade.

Standards	Explanations and Examples
Students are expected to:	The Standards for Mathematical Practice describe ways in which students ought to engage with the subject matter as they grow in mathematical maturity and expertise.
5.MP.1. Make sense of problems and persevere in solving them.	Students solve problems by applying their understanding of operations with whole numbers, decimals, and fractions including mixed numbers. They solve problems related to volume and measurement conversions. Students seek the meaning of a problem and look for efficient ways to represent and solve it. They may check their thinking by asking themselves, "What is the most efficient way to solve the problem?", "Does this make sense?", and "Can I solve the problem in a different way?".
5.MP.2. Reason abstractly and quantitatively.	Fifth graders should recognize that a number represents a specific quantity. They connect quantities to written symbols and create a logical representation of the problem at hand, considering both the appropriate units involved and the meaning of quantities. They extend this understanding from whole numbers to their work with fractions and decimals. Students write simple expressions that record calculations with numbers and represent or round numbers using place value concepts.
5.MP.3. Construct viable arguments and critique the reasoning of others.	In fifth grade, students may construct arguments using concrete referents, such as objects, pictures, and drawings. They explain calculations based upon models and properties of operations and rules that generate patterns. They demonstrate and explain the relationship between volume and multiplication. They refine their mathematical communication skills as they participate in mathematical discussions involving questions like "How did you get that?" and "Why is that true?" They explain their thinking to others and respond to others' thinking.
5.MP.4. Model with mathematics.	Students experiment with representing problem situations in multiple ways including numbers, words (mathematical language), drawing pictures, using objects, making a chart, list, or graph, creating equations, etc. Students need opportunities to connect the different representations and explain the connections. They should be able to use all of these representations as needed. Fifth graders should evaluate their results in the context of the situation and whether the results make sense. They also evaluate the utility of models to determine which models are most useful and efficient to solve problems.
5.MP.5. Use appropriate tools strategically.	Fifth graders consider the available tools (including estimation) when solving a mathematical problem and decide when certain tools might be helpful. For instance, they may use unit cubes to fill a rectangular prism and then use a ruler to measure the dimensions. They use graph paper to accurately create graphs and solve problems or make predictions from real world data.
5.MP.6. Attend to precision.	Students continue to refine their mathematical communication skills by using clear and precise language in their discussions with others and in their own reasoning. Students use appropriate terminology when referring to expressions, fractions, geometric figures, and coordinate grids. They are careful about specifying units of measure and state the meaning of the symbols they choose. For instance, when figuring out the volume of a rectangular prism they record their answers in cubic units.
5.MP.7. Look for and make use of structure.	In fifth grade, students look closely to discover a pattern or structure. For instance, students use properties of operations as strategies to add, subtract, multiply and divide with whole numbers, fractions, and decimals. They examine numerical patterns and relate them to a rule or a graphical representation.
5.MP.8. Look for and express regularity in repeated reasoning.	Fifth graders use repeated reasoning to understand algorithms and make generalizations about patterns. Students connect place value and their prior work with operations to understand algorithms to fluently multiply multi-digit numbers and perform all operations with decimals to hundredths. Students explore operations with fractions with visual models and begin to formulate generalizations.

Grade 5 Montana Common Core Standards Vocabulary				
Operations and Algebraic Thinking	Numbers and Operations in Base Ten	Number and Operations: Fractions	Measurement & Data	Geometry
	exponents	numerator	convert	axes/axis
braces	base	denominator	conversion	intersect
brackets	powers of 10	equivalent	line plot	Origin
parentheses	digit	mixed number	unit fraction	coincide
numerical expression	number	unlike denominator	volume	coordinates
evaluate	whole number	like denominator	unit cube	coordinate system
expression	base 10 numerals	benchmark fraction	cubic unit	coordinate plane
equation	expanded form	fraction model	solid figure	ordered pair
numerical pattern	standard form	estimate	additive	x-axis
corresponding terms	number name	fraction	right rectangular prism	y-axis
ordered pairs	< less than	partition	edge	x-coordinate
coordinate plane	> greater than	unit fraction	face	y-coordinate
graph	= equal	unit cube	base	quadrant
	thousandths	scaling	vertices	point
	tenths	rectangular areas		two-dimensional figure
	hundredths	non-zero whole number		subcategory
	product	compute		category
	round			properties
	decimal			
	decimal place			
	standard algorithm			
	quotient			
	operations			
	multiplication			
	division			
	area model			
	rectangular array			